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ORIGINAL ARTICLE

SPEED AND AGILITY AS DETERMINANTS OF LONG JUMP PERFORMANCE

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Abstract:

The aim of this study was to find out how far speed and agility serves as determinants of long jump performance. To achieve the purpose of the study, the investigator randomly selected 40 long jumpers who participated at inter collegiate level athletic meets, representing different colleges. The selected subjects were measured of their speed using 50 M sprint test, agility using 4 x 10 shuttle run and long jump performance following the standard procedure. The collected data on speed, agility were correlated with long jump performance to find out the association between speed and agility with long jump performance. The obtained data were further subjected to statistical analysis using Multiple regression analysis to find out whether speed and agility combined together contributes for the long jump performance of these athletes. The Correlation co-efficient results proved that there was significant relationship ($P<0.05$) between speed and long jump performance while there was no significant relationship between agility and long jump performance. The multiple regression analysis results proved that long jump performance can be determined based on speed and agility and based on the results suitable formulae were determined. It was concluded the formulae suggested in this study, can be used to determine the long jump performance of long jumpers.

KEY WORDS:

Speed, Agility, Determinants of Long Jump Performance.

INTRODUCTION

Athletic performance is the sum total of numerous facts on which, it will be varying from individual to individual, even if they ultimately achieve similar results in competition. A few centimeters or fraction of seconds decide record performance, victory or defeat in competition. (Swaddling, Judith (2004) It is very important to mobilise the potential of each individual. Athletics is an individual sports event of a person in sports field. This sports event varies according to their performance and physical fitness of the body. In the games and sports field, physical fitness components is very essential to achieve the peak performance of an individual. To achieve the goal exactly, the athletes must have dedication of right practices. Hence, physical fitness plays a vital role for each and every synchronized movements of the body.(Tricard, Louise Mead (1996). A jump is a motion which carries the body through the air from the take-off. In a jump the propulsive force may be exerted either by foot or by both feet. In long jump, the run preceding the jump gives the forward movements and vertical determined by the strength which are involved in these movements. There is an old adage that an athlete will go as long as his legs will carry him.(Stephen G. Miller 2004)

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Lockie RG et al. (2014) investigated relationships between the lower-body focused screens and overall performance and multidirectional speed and jumping capabilities. And found the deep squat (DS) did moderately correlate with between-leg difference (r = -0.423), and bilateral vertical jump (VJ) (r = -0.428) and Standing broad jump (SBJ) (r = -0.457). When stratified into groups according to DS score, high performers had a 13% greater SLJ when compared to intermediate performers, which was the only significant result. The functional movement screen (FMS) appears to have minimal capabilities for identifying movement deficiencies that could affect multidirectional speed and jumping in male athletes. Stodden DF et al. (2014) examined associations among motor skill competence (MSC) and health-related fitness (HRF) in youth and found that development of object control skills in childhood may be important for the development and maintenance of HRF across childhood and into adolescence. Marcovic G. (2007) examined the relationship between the leg extensor strength and power and agility performance. The correlations between strength and power, and each agility performance were generally low. As a consequence, the multiple correlation coefficients between strength and power predictors and agility, albeit significant ($P<0.01$), were also rather low ($r=0.33$, 0.44, and 0.35 for the lateral stepping, 20-yard shuttle run, and slalom run, respectively). The highest relationship with each of the agility tests was revealed by the one-leg rising test (r within -0.3 and -0.44; $P<0.02$). The results of the present study suggest that most of the multijoint leg extensor strength and power measures are poor predictors of agility in physically active men. Thus, the effects of interventions aimed towards the improvement of functional movement performance may not require evaluation by means of the common tests of muscular strength and power. A more specific approach including both the functional strength tests and functional movement performance tests could be recommended instead. Sheppard JM, et.al. (2008) examined the potential strength, power, and anthropometric contributors to vertical jump performances that are considered specific to volleyball success: the spike jump (SPJ) and counter-movement vertical jump (CMVJ) The results of this study clearly demonstrate that in an elite population of volleyball players, stretch-shortening cycle performance and the ability to tolerate high stretch loads, as in the depth jump, is critical to performance in the jumps associated with volleyball performance. The theoretical foundations laid based on previous researches proved that there were few attempts made to find out the determinants for jumping performances of different sports and games among different groups of people. And it was found that there was further scope for research to find out whether long jump performance is determined by speed and agility of collegiate level athletes.

METHODOLOGY

To achieve the purpose of the study, the investigator randomly selected 40 long jumpers who participated at inter collegiate level athletic meets, representing different colleges. The selected subjects were measured of their speed using 50 M sprint test, agility using 4 x 10 shuttle run and long jump performance following the standard procedure. The collected data on speed, agility were correlated with long jump performance to find out the association between speed and agility with long jump performance. The obtained data were further subjected to statistical analysis using Multiple regression analysis to find out whether speed and agility combined together contributes for the long jump performance of these athletes.

RESULTS

Tab 1: Showing Descriptive Statistics, Number of Subjects, Means and Standard Deviation on Speed, Agility and Long Jump Performance of the Subjects

S.No	Variables	No. of Subjects	Mean	Standard Deviation
1	Speed	40	7.00	0.22
2	Agility	40	10.65	0.48
3	Long Jump Performance	40	5.36	0.36

The descriptive statistics showed that the average speed of the subjects were 7.00 seconds to sprint 50 M run with standard deviation of + 0.22. The average agility scores of the subjects were 10.65 seconds with standard deviation of + 0.48. The long jump performance average score was 5.36 Meters with

standard deviation of 0.36. The obtained data were statistically analysed to find out whether speed and agility have any significant relationship with long jump performance.

Tab 2: Showing Pearson Coefficient Correlation Between Criterion and Independent Variables

S.No	Variables LONG JUMP PERFORMANCE Vs	No. of Subjects	Obtained 'r'	Required 'r'
1	Speed	40	0.34*	0.304
2	Agility	40	0.24	0.304

* Significant at 0.05 level.

The results proved that there was significant relationship between speed of the subjects and their long jump performance (P<0.05) and there was no significant relationship between agility and long jump performance of the subjects.

In order to determine whether speed and agility serve as determinant of long jump performance, the obtained data were further subjected to statistical analysis using Multiple Regression analysis and the results are presented below.

Tab 3: Showing Multiple Regression Analysis on Speed and Agility and Long Jump performance

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.450	0.202	0.159	0.325

a Predictors: (Constant), AGILITY, SPEED

Tab 4: Showing Analysis of Variance between Regression and Residual between Long Jump Performance and Speed and Agility

	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.993	2	0.496	4.692	.015
Residual	3.914	37	0.106		
Total	4.906	39			

Required table value (df 2,37) at 0.05 level = 3.25
* Significant at 0.05 level.
Predictors: (Constant), AGILITY, SPEED
Dependent Variable: Long Jump Performance

Tab 5: Showing Beta Unstandardised Co-Efficients, Constant Value And Significance of Selected Variables

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	11.923	2.143		5.565	.000
SPEED	-0.604	.237	-0.378	-2.554	.015
AGILITY	-0.219	.110	-0.294	-1.990	.054

a Dependent Variable: Performance

DISCUSSION ON RESULTS

The results presented in Table 2 proved that there was significant relationship between speed and long jump performance of the subjects. The multiple regression analysis results to determine speed and agility combined together on long performance proved that 45% of long jump performance is contributed by speed and agility (Table 3) and ANOVA calculations between regressed and residual being significant at 0.05 level the results proved that speed and agility combined together contributes for the long jump performance (Table 4). Based on the results presented in Table 5 the long jump performance of the subjects can be determined through the following formulae.

Y (Long Jump Performance) = X_1 (Speed) + X_2 (Agility) + C (constant)
Therefore the long jump performance is determined by speed and agility based on the formulae Long Jump Performance = -0.604 (Speed) -0.219 (Agility) + 11.923.

CONCLUSIONS

It was concluded the formulae suggested in this study, can be used to determine the long jump performance of long jumpers.

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